Physical Science Chapter 9 Notes

9.1 Carbon based molecules have many structures

* Living and nonliving things contain carbon
  + Carbon is the most important element for life
* **Organic Compound:** based on carbon. Often contains CHNOPS
* **Inorganic Compound:** typically compounds without carbon
  + Except diamond, graphite, cyanides, carbon dioxide, and carbonates
* Carbon forms many different compounds
  + Carbon bonded with Carbon can form either single, double, or triple bonds
    - C-C C=C C=-C
  + Carbon always shares 4 pairs of electrons in 4 covalent bonds
  + Carbon forms only a single bond with Hydrogen
* Carbon based molecules have different structures
  + **Carbon chains**
    - Straight Chained: All of the bonds occur in a straight line
      * C-C-C-C-C-C-C-CH-C
    - Branched Chain: additional carbon atoms or chains are bonded to an original straight chain
    - (Draw the picture of a branched chain molecule)
  + **Carbon Rings**
    - Carbon molecules shaped like a ring, typically contain 5-6 carbon atoms
    - Carbon rings containing more than 20 Carbon atoms do not naturally occur
    - There are different types of ring structures
      * Benzene is the most important because many structures are based off the Benzene ring
        + **Aromatic compounds** – based on the Benzene structure have a strong smell

Vanillin

* **Isomers:** compounds that contain the same atoms but in different places
  + End up with different substances because of the different structures
    - Ex. Butane and Isobutane
    - Ex. Retinol in eyes becomes and isomer when hit with light = triggers signal to brain = sight

9.2 Carbon-based molecules are life’s building blocks

* Carbon-based molecules have many functions in living things
  + CHNOPS
  + Marcomolecules – very large molecules
* Living things contain four major types of carbon-based molecules
  + **Carbohydrates:** sugars, starches, and cellulose
    - Contain atoms of carbon, hydrogen, and oxygen
    - Two main functions
      * Source of chemical energy for cells in many living things
      * Part of the structural materials of plants
  + **Lipids**: include fats and oils and are used mainly for energy and as structural materials in living things
    - Most are made of carbon, hydrogen, and oxygen
    - Saturated fats – all atoms form single bonds with each other
    - Unsaturated fats – at least one atom forms a double bond with another
  + **Proteins**: marcomolecules that are made of smaller molecules called amino acid
    - Contain carbon, hydrogen, and oxygen. Also contain nitrogen, sulfur and other elements
    - Have many different functions
    - 20 amino acids make up all the proteins of the human body
    - Function of the protein depends on structure
    - **Enzyme** – a catalyst for a chemical reaction in living things – increase rate of chemical reaction
  + **Nucleic Acids**: huge, complex carbon-based molecules that contain the information that cells use to make proteins
    - **DNA**: deoxyribonucleic acid
    - **RNA**: ribonucleic acid

9.3 Carbon-based molecules are in many materials

* Carbon-based compounds from ancient organisms are used to make new materials
  + **Hydrocarbon** – a compound made of only carbon and hydrogen
* Draw the Carbon Cycle picture in your notes!! Pg. 292
* Polymers contain repeating carbon-based units
  + **Polymers** – very large carbon-based molecules made of smaller, repeating units
  + **Monomers** – small repeating units linked together one after another to form a polymer
  + Properties of a polymer depend on the size and structure of the polymer molecule which depends both on the type of monomers it is made of and how many monomers there are
  + **Plastic** – a polymer that can be molded or shaped